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Date:
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Ref: 17/4/AEL/MP312/11/09

Dear Ms Nembilwi

KRIEL POWER STATION'S MONTHLY STACK EMISSIONS REPORT FOR THE MONTH OF JANUARY 2021

This serves as the monthly report required in terms of Section 7.4 in Kriel Power Station's Atmospheric Emission License 17/4/AEL/MP312/11/09. The emissions are for the month of January 2021. Verified emissions of particulates matter, SO₂ and NO_x (as NO₂) are also included.

Raw Materials and Products

Table 1: Quantity of Raw Materials and Products used/produced for the month of January 2021

Raw Materials and Products used	Raw Material Type	Units	Maximum Permitted Consumption / Rate (Quantity)	Consumption / Rate in Month of January 2021
	Coal	Tons/month	1 227 600	541 052
	Fuel Oil	Tons/month	5 000	2744.43
Production Rates	Product/ By-Product Name	Unit	Maximum Production Capacity Permitted (Quantity)	Production Rate in Month of January 2021
	Ash	Tons/month	not specified	975.9
	RE PM	kg/MWh	not specified	1.31

1/...

Abatement Technology

Table 2: Abatement Equipment Control Technology for January 2021.

Associated Unit/Stack	Technology Type	Actual Efficiency (%)
		January 2021
Unit 1	ESP	98.34%
Unit 2	ESP	98.51%
Unit 3	ESP	Outage
Unit 4	ESP	99.69%
Unit 5	ESP	99.69%
Unit 6	ESP	99.66%

Energy Source Characteristics

Table 3: Energy Source Material Characteristics for the month of January 2021





Characteristic	Stipulated Range (Unit)	Monthly Average Content
Sulphur Content	0.6-1.2 (%)	0.75
Ash Content	21-36 (%)	25.90

Monthly Monitor Reliability

Associated Unit/Stack	PM (%)	SO _x (%)	NO _x (%)
North	50.67	96.19	97.82
South	95.89	100.00	100.00

Emissions Reporting

Table 6.5: Graph Legend Description

Condition	Colour	Description
Normal		Emissions below Emission Limit Value (ELV)
Grace		Emissions above the ELV during grace period
Section 30		Emissions above ELV during a NEMA S30 incident
Contravention		Emissions above ELV but outside grace or S30 incident conditions

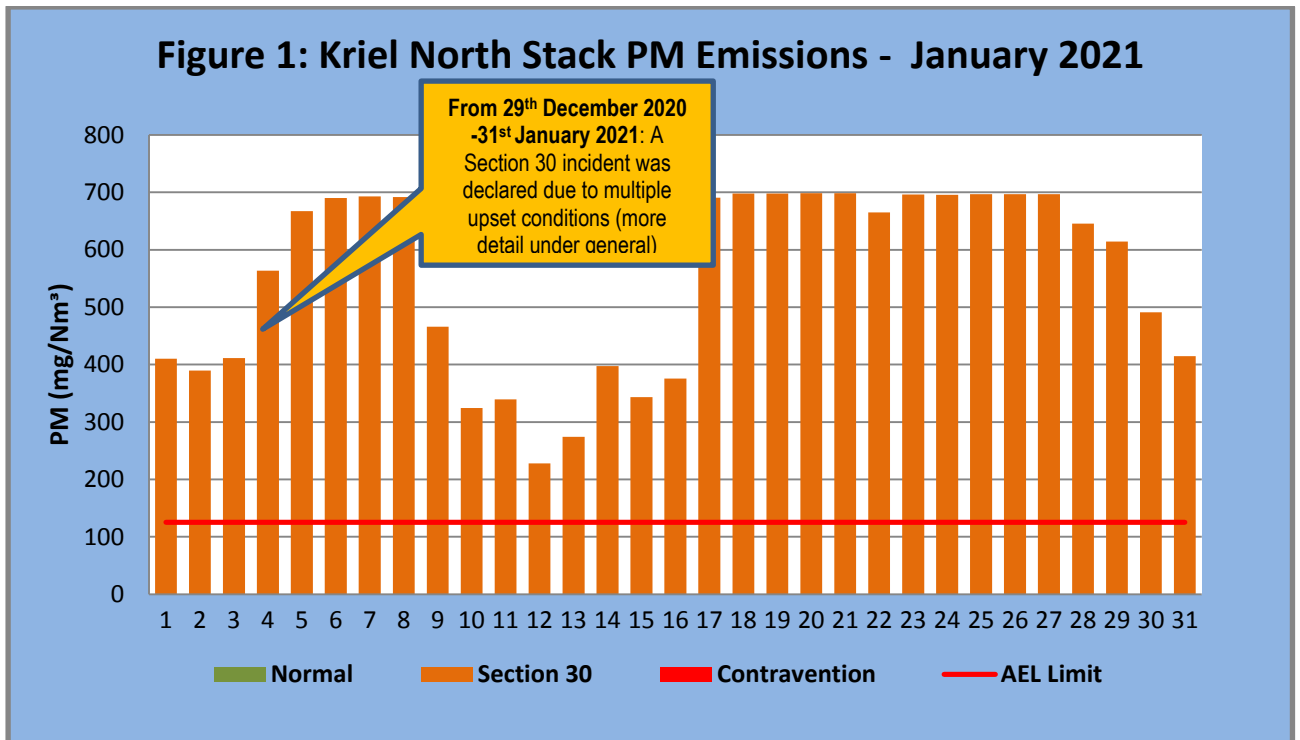


Figure 1: PM emissions (daily averages) for the month of January 2021 against emission limit for the North Stack

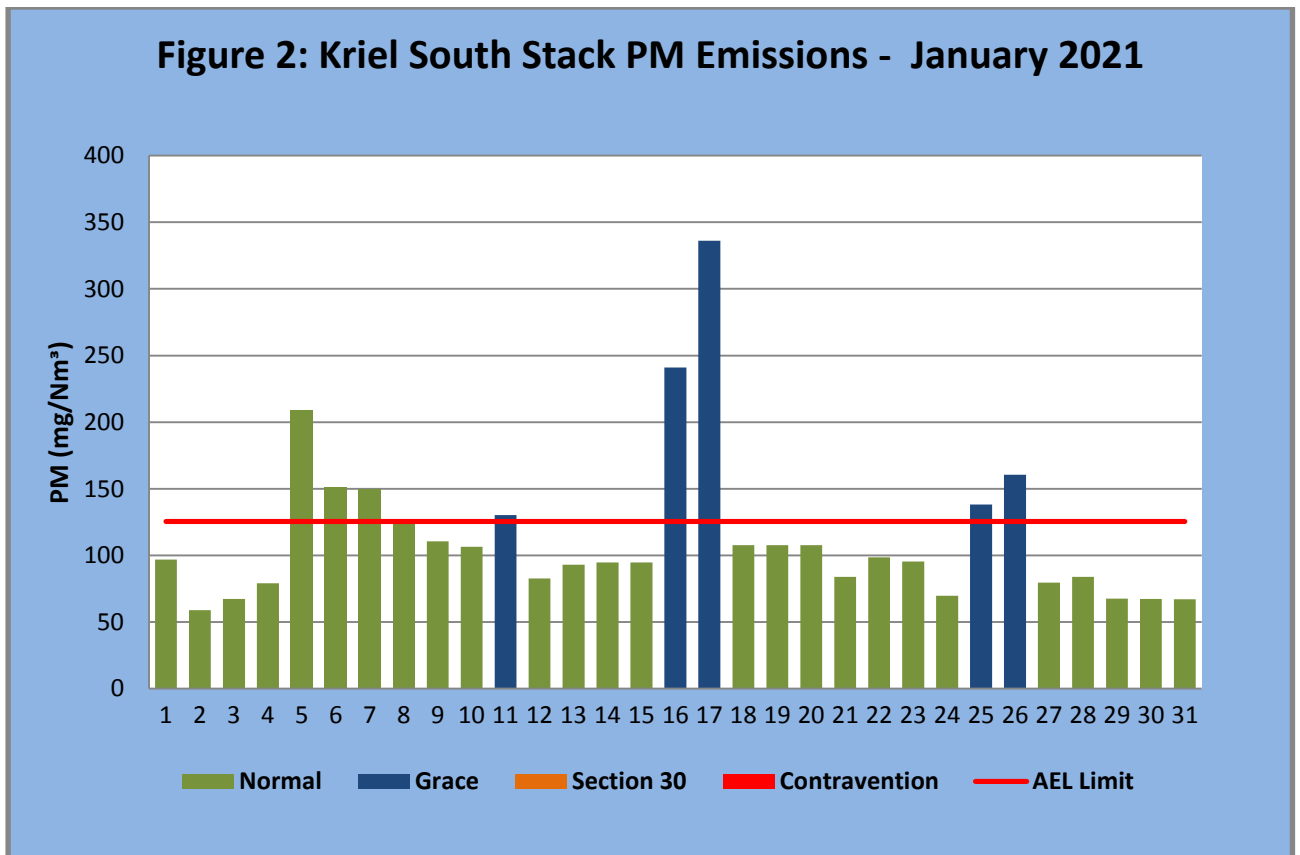


Figure 2: PM emissions (daily averages) for the month of January 2021 against emission limit for the South Stack

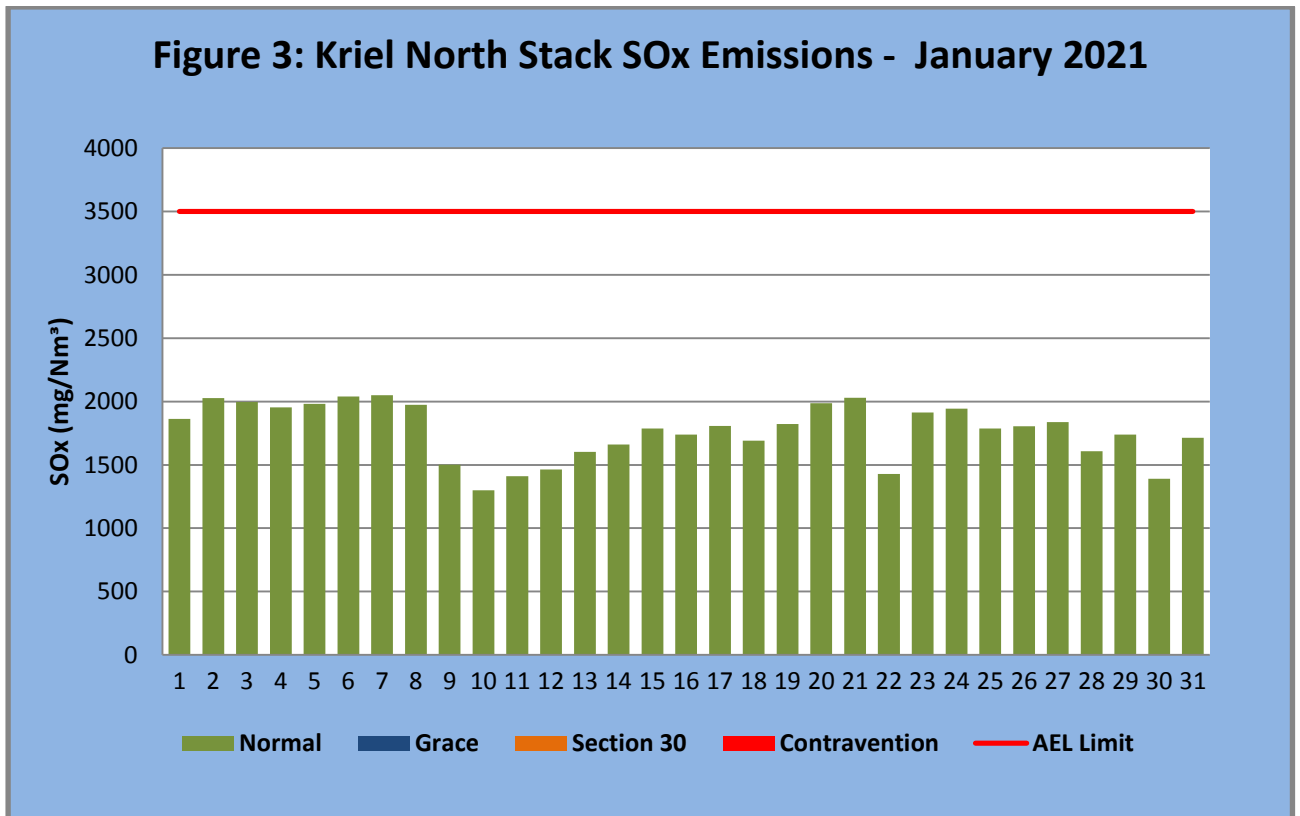


Figure 3. SO₂ emissions (daily averages) for the month of January 2021 against emission limit for the North Stack. The SO_x Limit is 3500mg/Nm³.

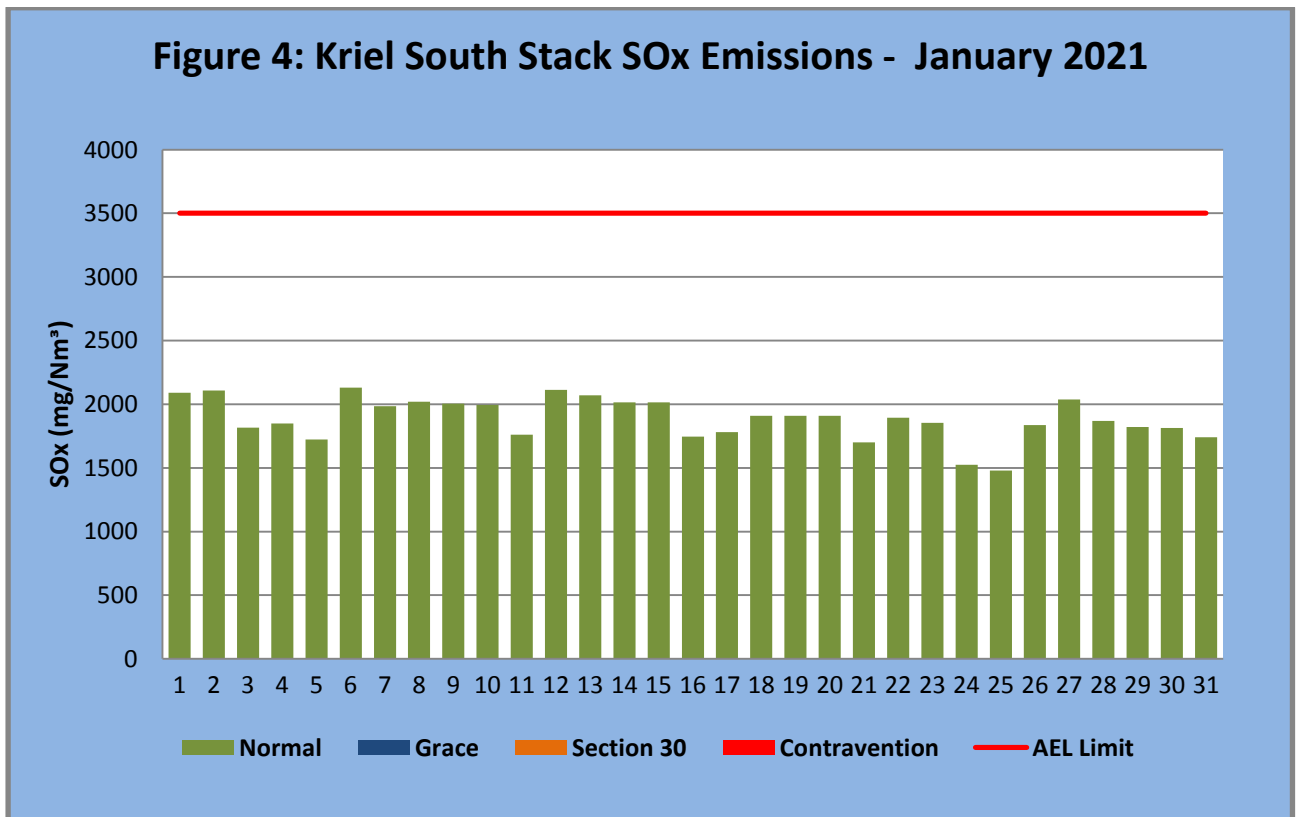


Figure 4. SO₂ emissions (daily averages) for the month of January 2021 against emission limit for the South Stack. The SO_x Limit is 35000mg/Nm³.

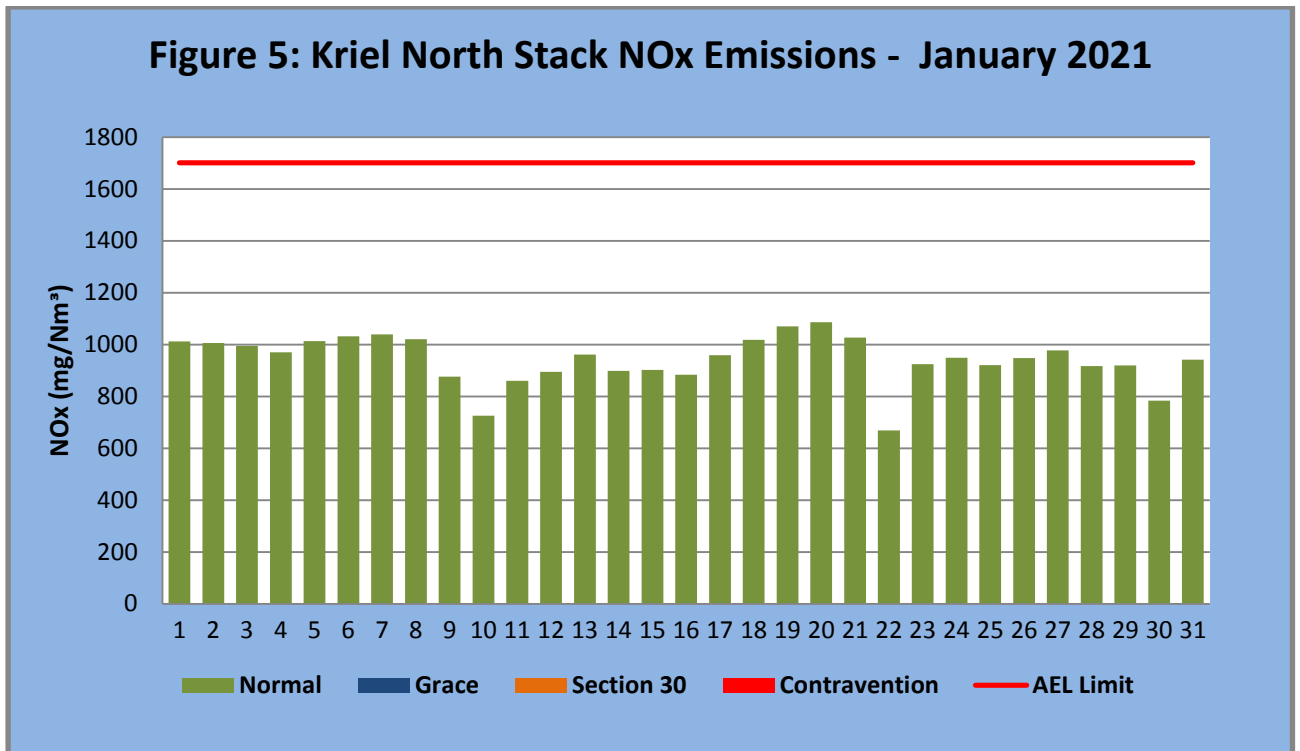


Figure 5. NO₂ emissions (daily averages) for the month of January 2021 against emission limit for the North Stack. The NO_x Limit is 1600mg/Nm³.

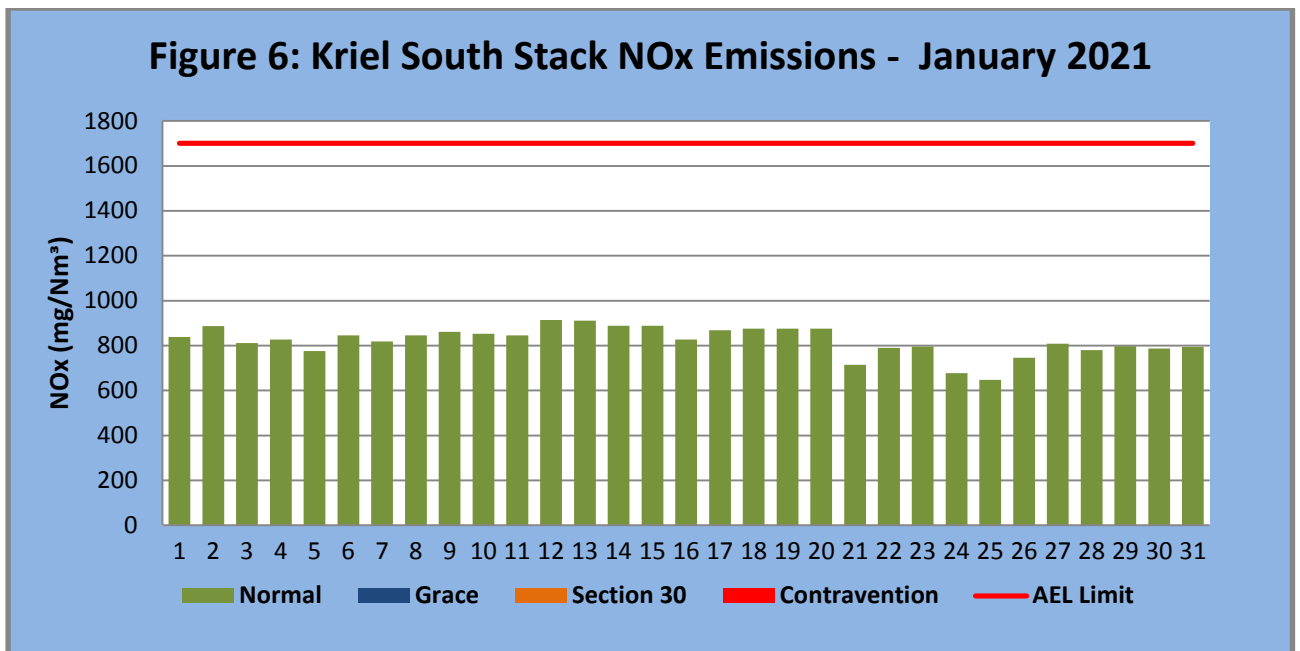


Figure 6. NO₂ emissions (daily averages) for the month of January 2021 against emission limit for the South Stack. The NO_x Limit is 1600mg/Nm³.

Table 4: Monthly tonnages for the month January 2021

Unit	PM (tons)	SO ₂ (tons)	NO ₂ (tons)
SUM	975.9	7260.2	3390.5

Table 5: Each unit and respective days operating under normal operation and section 30 days respectively

Table 5.1: Operating days in compliance to PM AEL Limit - January 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm ³)
North	0	0	31	0	0	550.46
South	26	5	0	0	0	114.87

Table 5.2: Operating days in compliance to SOx AEL Limit - January 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm ³)
North	31	0	0	0	0	1 769.5
South	31	0	0	0	0	1 887.7

Table 5.3: Operating days in compliance to NOx AEL Limit - January 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm ³)
North	31	0	0	0	0	941.8
South	31	0	0	0	0	821.7

Light up information

Table 6: PM Start-up information for the month of fabricate January 2021

North Stack	Event 1		Event 2	
Unit No.	<i>Unit 1</i>		<i>Unit 1</i>	
Breaker Open (BO)	<i>2:45 AM</i>	<i>2021/01/06</i>	<i>2:00 AM</i>	<i>2021/01/09</i>
Draught Group (DG) Shut Down (SD)	<i>5:20 PM</i>	<i>2021/01/06</i>	<i>3:40 AM</i>	<i>2021/01/09</i>
BO to DG SD (duration)	<i>00:14:35</i>	DD:HH:MM	<i>00:01:40</i>	DD:HH:MM
Fires in time	<i>3:15 AM</i>	<i>2021/01/07</i>	<i>6:05 AM</i>	<i>2021/01/12</i>
Synch. to Grid (or BC)	<i>7:45 AM</i>	<i>2021/01/07</i>	<i>12:10 PM</i>	<i>2021/01/12</i>
Fires in to BC (duration)	<i>00:04:30</i>	DD:HH:MM	<i>00:06:05</i>	DD:HH:MM
Emissions below limit from BC (end date)	<i>12:00 AM</i>	<i>2020/12/26</i>	<i>12:00 AM</i>	<i>2020/12/26</i>
Emissions below limit from BC (duration)		DD:HH:MM		DD:HH:MM
North Stack	Event 3		Event 4	
Unit No.	<i>Unit 2</i>		<i>Unit 3</i>	
Breaker Open (BO)	<i>7:45 PM</i>	<i>2021/01/13</i>	<i>BO previously</i>	<i>BO previously</i>
Draught Group (DG) Shut Down (SD)	<i>10:00 AM</i>	<i>2021/01/14</i>	<i>n/a</i>	<i>n/a</i>
BO to DG SD (duration)	<i>00:14:15</i>	DD:HH:MM	<i>n/a</i>	DD:HH:MM
Fires in time	<i>6:45 PM</i>	<i>2021/01/15</i>	<i>10:30 AM</i>	<i>2021/01/31</i>
Synch. to Grid (or BC)	<i>12:25 AM</i>	<i>2021/01/16</i>	<i>3:25 PM</i>	<i>2021/01/31</i>
Fires in to BC (duration)	<i>00:05:40</i>	DD:HH:MM	<i>00:04:55</i>	DD:HH:MM
Emissions below limit from BC (end date)	<i>not > limit</i>	<i>not > limit</i>	<i>not > limit</i>	<i>not > limit</i>
Emissions below limit from BC (duration)	<i>n/a</i>	DD:HH:MM		DD:HH:MM

South Stack	Event 1		Event 2			
Unit No.	Unit 4		Unit 4			
Breaker Open (BO)	10:45 AM	2021/01/09	1:10 AM	2021/01/16		
Draught Group (DG) Shut Down (SD)	DG did not trip or SD	DG did not trip or SD	12:05 PM	2021/01/16		
BO to DG SD (duration)	n/a	DD:HH:MM	00:10:55	DD:HH:MM		
Fires in time	10:45 AM	2021/01/09	6:00 AM	2021/01/18		
Synch. to Grid (or BC)	7:30 PM	2021/01/09	11:35 AM	2021/01/18		
Fires in to BC (duration)	00:08:45	DD:HH:MM	00:05:35	DD:HH:MM		
Emissions below limit from BC (end date)	not > limit	not > limit	12:00 AM	2020/12/26		
Emissions below limit from BC (duration)	n/a	DD:HH:MM		DD:HH:MM		
South Stack	Event 3		Event 4		Event 5	
Unit No.	Unit 5		Unit 6		Unit 6	
Breaker Open (BO)	11:10 PM	2021/01/09	BO previously	BO previously	9:15 AM	2021/01/11
Draught Group (DG) Shut Down (SD)	1:05 PM	2021/01/10	n/a	n/a	10:20 AM	2021/01/11
BO to DG SD (duration)	00:13:55	DD:HH:MM	n/a	DD:HH:MM	00:01:05	DD:HH:MM
Fires in time	2:25 PM	2021/01/17	1:40 AM	2021/01/10	3:05 AM	2021/01/13
Synch. to Grid (or BC)	4:50 AM	2021/01/20	6:20 AM	2021/01/10	12:30 PM	2021/01/15
Fires in to BC (duration)	02:14:25	DD:HH:MM	00:04:40	DD:HH:MM	02:09:25	DD:HH:MM
Emissions below limit from BC (end date)		#VALUE!	not > limit	not > limit	not > limit	not > limit
Emissions below limit from BC (duration)	n/a	DD:HH:MM	n/a	DD:HH:MM	n/a	DD:HH:MM

Complaints Register

Table 9: Complaints for the month of January 2021.

Source Code/ Name	Root Cause Analysis	Calculation of Impacts/ emissions associated with the incident	Dispersion modeling of pollutants where applicable	Measures implemented to prevent reoccurrence	Date by which measure will be implemented
There was no complaint related to air quality received during the month of January 2021.					

General

The particulate matter (PM10) emissions on the South common stack were within the **monthly limit**, whereas the North Stack exceeded the **monthly limit** during the month of January 2021. North stack recorded the monthly PM10 average figure of **550.5 mg/Nm3** due to an upset condition which was declared as a section 30 incident (refer to the details below); while south stack recorded PM10 monthly average figure of **114.9 mg/Nm3**.

NB: North Stack's PM10 monitor fell short of the legal threshold in terms of availability; the monitor availability was around 50.67%. The aforementioned monitor issue was caused by events of high emissions (upset conditions resulting into NEMA section 30 incident) which have been explained below; thus, when the emissions reading exceed 400mg/Nm3, the monitor reliability also becomes compromised.

The gaseous (NO_x & SO_x) emissions on the north and south common stacks were within the **daily limit** during the month of January 2021; refer to graphs above.

North Stack – PM Exceedance (NEMA Section 30 Declared)

- On Tuesday, the 29 of December 2020 (at around 11:50) a gradual increase on north stack's emissions performance was noted resulting into particulate matter emissions averaging above the legal limit of 125mg/Nm³.
- On the 29th of December 2020, Operating Department noted that an increase on north stack PM10 emissions was caused by sudden failure of unit 1 Electric Feed Pump (EFP) which was being maintained online under a unit half load.
- On the 30th of December 2020, unit 1's electric heater was also reported to be misfiring and therefore causing an increase in PM10 emissions. Electrical Maintenance Department (EMD) also discovered that the heater phase had failed hence the misfiring.
- Starting from the 31st of December 2020 till the 2nd of January 2021, EMD attempted to repair the heater online on a number of occasions; however, all these attempts were unsuccessful. .
- On the 3rd of January 2021, a decision was taken to completely remove the heater from the plant to the workshop for repairs; the heater was indeed removed and the repair works was completed on the 8th of January 2021.
- On the 9th of January 2021, unit 1 was shut down in order to effectively repair the EFP issue which appeared to be recurring despite efforts to repair it online; the shutdown also provided an opportunity to ensure that unit 1 SO₃ heater was effectively installed back to the plant.
- The defective electric heater was replaced; and the EFP's non-end bearing was also repaired successfully. The plant was returned to service on the 11 January 2021.
- Unfortunately, on the 12 of January 2021 it was reported that sulphur suction strainers were blocking and therefore affecting all north stack units due to sulphur which was found to be contaminated with impurity
- From the 12th to the 15th of January 2021, various efforts to unblock the suction strainers were made, but with no success.
- On the 16th of January 2020, a decision was taken to drain contaminated sulphur from the tank with the assistance of a specialist company (Howden).
- The exercise to drain the tank was slower than anticipated; this activity was completed on the 25th of January 2021. The events articulated above have resulted into the underperformance of particulate matter emissions' abatement technology on the north common stack and ultimate high emissions.
- On the 26th of January 2021, the team will be welding the cuts, undertaking non-destructive tests on all the mechanical works, and then heat up the system preparing it for commissioning.
- On the 27th of January 2021, the north stack SO₃ storage tank will filled; and thereafter will be commissioned.

NB: The rest of the information demonstrating compliance with the emission license conditions is supplied in the annual emission reports sent to your office.

Kriel Power Station's List of NEMA Section 30 Incidents for 2021/2021 Financial Year

Month	Description of Section30 Incidents - including the reference number	Root Cause (s)	Status of S30 Incident with DEFF (open or closed)	Remarks
April - 2021	No section 30 incident reported.			No event to report.
May - 2021	No section 30 incident reported.			No event to report.
June - 2021	No section 30 incident reported.			No event to report.
July - 2021	No section 30 incident reported.			No event to report.
Aug - 2021	Upset condition in unit 4, 5&6 exceeded 48 hours grace period. Section 30 compiled in terms of Section 7.3.2 Kriel's Atmospheric Emissions License	High hopper levels and ash transportation backlog at Unit 5 due to MCB	Open	1 Event reported
Sep - 2021	No section 30 incident reported.			No event to report.
Oct - 2021	No section 30 incident reported.			No event to report.
Nov - 2021	No section 30 incident reported.			No event to report.
Dec - 2021	Upset conditions in unit 1 & 2 exceeded 48hours grace period	Failure of 11KV overhead line due development of hotspot on the conductor.	Open	1 Event reported
Jan - 2021	Upset conditions in unit 1,2 and 3 exceeded 48hours grace period	<ul style="list-style-type: none"> •Misfiring SO3 electric heater due to heater phase failure. •Contaminated sulphur in the storage tank. 	Open	1 Event reported
Feb - 2021				
Mar - 2021				